3:9105-3:JMD: #232985

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re patent application of:	)
	) Before the Examiner
Samuel M.D. NORVILLE, et al.	)
	) Kuang Y. Lin
Serial No. 09/585,061	)
	) Group Art Unit 1725
Filed June 1, 2000	)
	) August 7, 2003
Apparatus For and Method of Producing On-Demand Semi-Solid Material for Castings	)

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to the Assistant Commissioner for Patents, Washington, D.C. 20231 on

August 7, 2003
(Date of Deposit)

James M. Durlacher
Name of Registered Representative

James M. Durlacher
Signature

August 7, 2003
Date of Signature

APPEAL BRIEF

Board of Patent Appeals and Interferences
Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

I. INTRODUCTION

The owner of record, AEMP Corporation, has executed an assignment of the subject patent application in favor of Innovative Products Group, LLC, a limited liability corporation of Michigan. The assignment by AEMP Corporation to Innovative Products Group, LLC was made and effective as of August 4, 2002. A copy of the assignment is enclosed in the Appendix. The current owner, Innovative Products Group, LLC, now submits its Appeal Brief. The Notice of Appeal was timely filed on June 2, 2003 and received by the United States Patent and Trademark Office on June 4, 2003. The required fee for a large entity was submitted at the time of filing the Notice of Appeal.

This Appeal is directed to the Final Office Action dated May 7, 2003, wherein all pending claims, including claims 1-19, 24-26, and 31-38, were rejected under 35 U.S.C. §103(a). In view of the three month date for response to that Final Office Action, the unextended deadline for filing this Appeal Brief is August 7, 2003. This Appeal Brief is being timely filed pursuant to 37 CFR §1.192(a) and the required fee pursuant to 37 CFR §1.17(c) of $320 is enclosed.

II. REAL PARTY IN INTEREST

37 CFR §1.192(c)(1)

Under 37 CFR §1,192(c)(1), a statement shall identify the real party in interest, if the party named in the caption of the brief is not the real party in interest.

The owner of record, AEMP Corporation, has executed an assignment of the subject patent application in favor of Innovative Products Group, LLC, a limited liability corporation of Michigan. The assignment by AEMP Corporation to Innovative Products Group, LLC was made and effective as of August 4, 2002.

III. RELATED APPEALS AND INTERFERENCES

37 CFR §1.192(c)(2)

There are no related appeals or interferences. The following applications were filed concurrently with the subject patent application and are presented as a listing of what cases might be considered "related" to the subject patent application:

Serial No./ Patent No.	Filing Date	Inventors	Title
09/585,296/ 6,399,017	June 1, 2000	Norville, et al.	Method and Apparatus for Containing and Ejecting a Thixotropic Metal Slurry
09/584,859/ 6,443,216	June 1, 2000	Lombard, et al.	Thermal Jacket For A Vessel
09/585,060/ 6,402,367	June 1, 2000	Lu, et al.	Method and Apparatus For Magnetically Stirring a Thixotropic Metal Slurry
09/585,502/ 6,432,160	June 1, 2000	Norville, et al.	Method and Apparatus For Making a Thixotropic Metal Slurry

Additionally, a continuation patent application has recently been filed and the information received from the United States Patent and Trademark Office indicates a filing date of July 10, 2003 and a Serial Number of 10/617,307.

IV. STATUS OF CLAIMS

37 CFR §1.192(c)(3)

Claims 1-19, 24-26 and 31-38 are presently pending in the subject patent application. Each claim stands rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,098,487 issued to Brauer et al. Claims 1-19, 24-26 and 31-38 are being appealed. Claims 1-30 were originally filed in the subject patent application. Claims 31-38 were added by amendment at a later date.

Applicants' response to the non-final Action dated October 18, 2002 was filed April 17, 2003 with a request for a three month extension of time. In the response, the status of each claim is stated, consistent with the new claim amendment format. From their originally-filed form, claims 1, 13, 18, 24, 25, 31, 35, 37, and 38 have been amended. The remaining claims at issue in this Appeal, including claims 2-12, 14-17, 19, 26, 32-34, and 36, remain in their original, as-filed form.

V. STATUS OF AMENDMENTS

37 CFR §1.192(c)(4)

The last non-final Office Action in the RCE version of the application was dated October 18, 2002. A response was filed April 17, 2003 with a request for a three month extension of time. In reply, the Examiner issued a Final Office Action dated May 7, 2003. In view of remarks made by the Examiner, a telephonic conference with the Examiner was requested in order to discuss whether adding "single shot" to the phrase "slurry billet" would result in allowance of all claims. A request was made by Applicants' attorney of record to have the Examiner's Supervisory Primary Examiner (SPE) participate in the conference, but it was reported by the Examiner that the SPE declined to do so. The prosecution history, noting the statements by the Examiner in the first Office Action, warranted the SPE's participation.

The Examiner would not rule at the time of the conference call on the "single shot" request, but asked instead that another RCE application be filed so that he could conduct further searching. Since the phrase "slurry billet", as defined in the specification, is a "single shot", this would already have been thoroughly searched, considering the number of Office Actions and responses already of record. Accordingly, and in order to preserve the record for appeal, a response after Final Action was filed June 2, 2003. This response requested reconsideration and focused specifically on particular statements made by the Examiner in the Final Office Action.

The Advisory Action from the Examiner dated June 16, 2003 indicates that Applicants' request for reconsideration has been considered but does not place the application in condition for allowance. The specific "reason" on the continuation sheet

states that "the invention as described is not deemed to be patentable over the cited prior art references for the same reasons as set forth in the last office action".

VI. SUMMARY OF INVENTION

37 CFR §1.192(c)(5)

With regard to an appropriate summary of the invention, it is believed that the language recited in claim 1 provides such a summary and includes many of the important points to be discussed and considered as part of this Appeal. As now pending, claim 1 recites a method of producing on-demand, semi-solid material for a casting process. Described is the specific method and the steps that are involved from the beginning to the point that the semi-solid material is discharged into the shot sleeve of a suitable casting machine. The invention begins with the step of heating a metal alloy until it reaches a molten state. At this point, an amount of that alloy is drawn off and transferred, while still in the molten state, to a separate vessel. In order to move and handle the alloy as a "slurry billet", between the vessel and the shot sleeve, cooling of the metal alloy, while in the vessel, is performed. While the cooling within the vessel occurs, an electromagnetic field is applied so as to create a flow pattern of the metal alloy. This combination of flow pattern and cooling quickly results in the creation of a slurry billet of the desired thixotropic solid-to-liquid ratio suitable for the intended casting task.

Since it is difficult to discharge or otherwise handle the "slurry billet" unless it is of the proper solid-to-liquid ratio, it is important that the solid fraction not be so high as to preclude a proper casting step. Clearly there is a critical balance between the handling and transfer of a slurry billet while, at the same time, maintaining the solid-to-liquid ratio suitable for casting. Once the slurry billet of the desired thixotropic solid-to-liquid ratio is created, it is discharged from the vessel directly and immediately into a shot sleeve of a casting machine. There are no intermediate stages of holding the slurry billet between the

vessel and the shot sleeve and there are no heating steps subsequent to discharging. The process is precise in the sense of creating just the right solid-to-liquid ratio for the ability to handle the slurry billet and the ability to properly cast the desired part.

Considering the specific elements of claim 1 and support for those elements within the specification and drawings, the following outline will hopefully prove helpful.

Claim Element	Location of Supporting Text and/or Drawings
A method of producing on-demand, semi-solid material for a casting process	This description of the invention is supported by the Background portion of the application, specifically pages 1-8; and on page 17, lines 14-26.
Heating a metal alloy until it reaches a molten state	Support for this portion of the invention summary is found on page 13, lines 12-14, and FIG. 2; and on page 14, lines 12-15, and FIG. 2A.
Transferring an amount of said metal alloy, while in said molten state, to a vessel	Support for this portion of the invention summary is found on page 13, lines 12-14, and FIG. 2; and on page 14, lines 14-16, and FIG. 2A
Cooling said amount of metal alloy in said vessel	Support for this portion of the invention summary is found on page 13, lines 20-23, and FIG. 2; on page 14, lines 16-20 and 27-31, and FIG. 2A; and page 15, lines 1-8 and lines 25-31, and FIG. 2A; and on page 24, lines 4-23.
Applying an electromagnetic field to said amount of metal alloy	Support for this portion of the invention summary is found on page 13, lines 14-16, and FIG. 2; and on page 14, lines 16-18, and FIG. 2A; and on page 28, lines 4-31.
Creating a flow pattern of said metal alloy within said vessel	Support for this portion of the invention summary is found on page 13, lines 14-16, and FIG. 2; and on page 14, lines 16-18, and FIG. 2A; and on page 28, lines 4-31.

Claim Element	Location of Supporting Text and/or Drawings
While cooling continues in order to create a slurry billet of the desired thixotropic solid to liquid ratio for casting	Support for this portion of the invention summary is found on page 1, first two paragraphs of the Background; page 13, lines 12-17 and 20-25, and FIG. 2; page 14, lines 15-18 and 27-31, and FIG. 2A; page 15, lines 1-8 and FIG. 2A; page 17, lines 14-31; and page 18, lines 1-5.
Discharging said slurry billet from said vessel, directly and immediately into a shot sleeve of a casting machine	Support for this portion of the invention summary is found on page 17, lines 14-26.
Without any intermediate stage of holding said slurry billet . . . and without any heating step subsequent to said discharging	Support for this portion of the invention summary is found on page 13, lines 23-27, and FIG. 2; page 15, lines 4-5, and FIG. 2A; page 17, lines 14-23; page 18, lines 16-27 and FIG. 5; and page 23, lines 13-15.

The claimed invention includes other recited elements as set forth in the remaining independent and dependent claims. However, for the purposes of this summary, the foregoing recitation, based principally on claim 1, is believed to be appropriate. With regard to some of the dependent claim elements, these are all well documented in the specification and drawings.

VII. ISSUES

37 CFR §1.192(c)(6)

The concise statement of issues presented for review by the Board is whether claims 1-19, 24-26, and 31-38 are unpatentable under 35 U.S.C. §103(a) over Brauer et al.

VIII. GROUPING OF CLAIMS

37 CFR §1.192(c)(7)

It is Applicants' understanding that since there is a single ground of rejection that is contested and that it applies to a group of two or more claims, the Board will default to the selection of a single claim of that group. Since the Applicants do not intend for all of the claims in this single group to stand or fall together, an explanation is offered in the Argument (Section IX) as to why the Applicants believe various claims to be separately or independently patentable. Accordingly, it is Applicants' position that all of the claims in the group identified by the Examiner, a grouping that constitutes all claims pending in the subject application, do not stand or fall together. As required, arguments are presented hereinafter why various claims, subject to the same rejection, are separately patentable.

Applicants' position with regard to the group of claims identified by the Examiner having been stated, Applicants acknowledge that there are likely subgroups of claims wherein the Board could select a single claim of the group, noting that the claims of that subgroup would all stand or fall together. In Applicants' opinion, appropriate subgroupings include the following:

Subgroup	Claims to be Included
A	Claims 1, 9, 16, 19, 24, and 25
B	Claims 2-8 and 26
C	Claims 10 and 13
D	Claims 11 and 14

Subgroup	Claims to be Included
E	Claims 12, 15, and 37
F	Claims 17 and 18
G	Claims 31-34
H	Claims 35 and 36
I	Claim 38

Applicants specifically state that the Board may select one claim of each Subgroup A through I as being representative of that subgroup. As such, all claims of each subgroup stand or fall together.

IX. ARGUMENT

37 CFR §1.192(c)(8)

A. Introduction

The Office Action dated May 7, 2003 is the Final Action that is the basis of this Appeal. In this Office Action, it is stated by the Examiner that "claims 1-9, 24-26, and 31-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. patent No. 5,098,487 to Brauer et al for the same reasons as set forth in the last office action". The referenced "last office action" is believed to be the Office Action dated October 18, 2002; however, the "reasons" summarized in the May 7, 2003 Office Action include statements that are not part of the "last office action". There do not appear to be any reasons in the October 18, 2002 Office Action that are not included in the May 7, 2003 Office Action. Accordingly, the May 7, 2003 Office Action is the focus of the following arguments.

B. Errors Noted In The Rejection

1. There is no showing of a suggestion or motivation to modify Brauer et al.

The Examiner has cited a single prior art reference as the basis to reject all pending claims. The rejection is under 35 U.S.C. §103(a). Since this is an acknowledgement that Brauer et al. does not anticipate the claimed invention, we are placed into that somewhat unique situation of a single prior art reference being relied upon to render a claim obvious. While this is available in appropriate circumstances, case law confirms that in order to do so, there must be a showing of a suggestion or motivation to modify the teachings of that reference to the claimed invention in order to

support the obviousness conclusion. This suggestion or motivation may be derived from the prior art reference itself, from the knowledge of one of ordinary skill in the art, or from the nature of the problem to be solved. Determining whether there is a suggestion or motivation to modify a prior art reference is one aspect of determining the scope and content of the prior art, a fact question subsidiary to the ultimate conclusion of obviousness. SIBIA Neurosciences, Inc. v. Cadus Pharm. Corp., 225 F.3d 1349; 55 U.S.P.Q.2d 1927, 1931 (Fed. Cir. 2000). One error in the rejection of claims 1-19, 24-26 and 31-38 is that the Examiner has not provided the requisite showing of a suggestion or motivation to modify the teachings of Brauer et al. to the claimed invention in order to support the obviousness conclusion.

While it is acknowledged by Applicants that this motivation can be derived from the prior art reference itself, there is nothing in Brauer et al. that provides any type of suggestion or motivation for its own modification as will be very clear from the remarks that follow.

It is also acknowledged that the suggestion or motivation to modify the teachings of the cited reference may be derived from the knowledge of one of ordinary skill in the art. However, a determination of what one of ordinary skill in the art might have knowledge of cannot be based on subjective belief and unknown authority. In re Lee, 277 F.3d 1338; 61 U.S.P.Q.2d 1430, 1434, (Fed. Cir. 2002). In the In re Lee case, the Federal Circuit was reviewing an action by the Board and Applicants see no reason why this case law should not be equally applicable to actions by an Examiner. In this case, the Federal Circuit found that the common knowledge and common sense on which the Board relied in rejecting Lee's application are not the specialized knowledge and

expertise contemplated by the Administrative Procedures Act. Conclusory statements such as those here provided do not fulfill the Agency's obligation. This Court explained in Zurco . . . that "deficiencies of the cited references cannot be remedied by the Board's general conclusions about what is basic knowledge or common sense. The Board's findings must extend to all material facts and must be documented on the record, lest the haze of so-called expertise acquired insulation from accountability. Common knowledge and common sense, even if assumed to derive from the Agency's expertise, do not substitute for authority when the law requires authority. In re Lee, supra.

The Examiner's several references to what would have been obvious, as set forth on pages 2, 3, and 4 of the Final Office Action, constitute errors in the rejection based upon the prevailing case law cited above.

2. The Examiner has not applied Brauer et al. to every element of every claim.

A further error is found in the fact that the Examiner, in his broad summary of what he believes Brauer et al. shows, has failed to specifically apply that reference to each and every element of various claims including specifically claims 1, 24, 25, 35, and 37. Apparently the Examiner believes that the summary of Brauer et al., appearing at the bottom of page 2 in the Final Office Action, is adequate to address all of the claim elements in these five claims. Since this summary very clearly does not do that, and since there is no discussion of how Brauer et al. might be modified to achieve or supplement its obvious deficiencies, this is seen as yet another error in the rejection of all pending claims. For example, there is no issue taken with the fact that Brauer et al. discloses the delivery of a semi-solid slurry from a vessel into a casting chamber.

However, all of the independent claims now pending and, by reference all of the dependent claims, include the limitation that what is created and what is discharged into the shot sleeve is a "slurry billet". The Examiner only makes reference to discharging the "slurry".

Another element of each of these five claims that has not been specifically addressed by the Examiner is the step of cooling the metal alloy in the vessel. The Examiner assumes that Brauer et al. performs its die casting method "by cooling a molten metal in a vessel". However, what Brauer et al. in fact discloses instead of cooling is the use of an induction heating coil 64 in order to maintain the temperature of the stirring chamber close to the solidification temperature of the alloy. (See, column 8, lines 28-30). There is no mention in Brauer et al. in that portion of the specification that pertains to FIG. 6 that there is any "cooling" of the alloy nor any cooling of the alloy "in said vessel". In fact, Brauer et al. actually teaches just the opposite. Brauer et al. teaches that you want to add heat to that stirring chamber in order to maintain the temperature. This heat is added by the use of an induction heating coil 64.

3. The Examiner is not entitled to add or infer disclosure that does not exist in Brauer et al.

It is seen as an error in the rejection to add language purported to be found in the cited reference when that language does not in fact exist. As will be discussed herein in the context of other claims and the overall theory of invention, the structure and method of FIG. 6 in Brauer et al. is seen as a gradual deposition of slurry from within the stirring chamber via opening 66 into the casting chamber. The statements in Brauer et al. in column 8, at lines 40 and 41, clearly evidence a gradual process and time delay. The

language states "when a sufficient quantity of slurry is in the die cavity 70". The description regarding the FIG. 6 structure also indicates that the casting chamber 70 contains insulated walls 72 and may include an induction heating means to prevent solidification of the slurry. The slurry is not going to solidify if the overall cycle and processing times are relatively fast. What you actually want to do, as described for the present invention, is to cool the slurry to the approximate casting composition and then transfer it immediately and directly to the shot sleeve so that the casting step can be performed without delay. In Brauer et al., there is a time delay and a concern over solidification of the slurry. As the slurry sits in the die cavity waiting for more slurry to accumulate to have the right shot size, there is a need to add heat to prevent (unwanted) cooling while the slurry is in the casting chamber 70. The concern over the slurry solidifying in the casting chamber 70 required the Brauer et al. design to include insulated walls 72 and possibly an induction heating means for the casting chamber 70. There is nothing logical in a design that might focus on "cooling" upstream and if achieved, then a need to heat the slurry downstream in order to have the right viscosity for casting.

It is not clear why the Examiner is motivated to inject "phantom" disclosure into the cited reference, but this is what has been done and is considered an error in the rejection.

4. Brauer does not "show" nor teach the required details of electromagnetic stirring.

A further error in the rejection is to suggest that Brauer et al. "shows" a die casting method which involves "stirring the same with either a mechanical means or an

electromagnetic means". Brauer et al. has but a single reference to "electromagnetic", and this single reference is a single word. This single word is found in column 8, at the end of line 27. The entire sentence reads, "The stirring means may be mechanical such as a the auger or electromagnetic". The mere mention of the fact that the stirring means may be electromagnetic does not constitute any type of teaching and there is clearly no showing of this structure in FIG. 6 or elsewhere in the Brauer et al. patent.

In the case of In re Lueders, 42 U.S.P.Q.2d 1481 (Fed. Cir. 1997), the Federal Circuit acknowledge that what a prior art reference "teaches" or "suggests" are two different inquiries. While Brauer at al. might suggest electromagnetic stirring by the use of that one word, "electromagnetic", this is far short of what would be required to actually teach electromagnetic stirring or to "show" electromagnetic stirring, to quote the Examiner. Clearly the use of but a single word, "electromagnetic", with nothing more being stated and nothing illustrated, does not rise to the level of any type of teaching. Any attempt to suggest that Brauer et al. "shows" electromagnetic stirring is an error in the rejection.

C. Specific Limitations in the Rejected Claims that are Not Described in the Prior Art

1. Brauer et al. does not disclose the creation of a "Slurry Billet".

Claim 1 of the subject patent application and in fact each independent claim recites the creation of "slurry billet" as a result of the recited method steps. This particular phrase and its terms are discussed and defined in the context of this application and the claimed invention on the first page of the application.

Page 1 of the original application discusses the fact that the present invention incorporates (1) electromagnetic stirring; (2) cooling; and (3) apparata to facilitate production of the semi-solid material within a comparatively short cycle time. Once the semi-solid material is produced, it is discharged directly into a shot sleeve.

The semi-solid material is defined in Applicants' specification as a "slurry" and the slug which is produced is a "single shot" and is referred to as a "billet". Accordingly, as defined in Applicants' specification, there is a single shot volume or mass of semi-solid material that is described as a "slurry billet". This is a semi-solid slug of material and the dictionary definition of "slug" refers to a heavy piece of metal. A "piece" of metal is inherently a discrete item with a defined volume. The phrase "slurry billet" is recited in each independent claim of the subject patent application and, as such, is recited by reference in each dependent claim. Importantly, in the context of the present invention, it is the "slurry billet" that is discharged directly and immediately into the shot sleeve. A "slurry billet" is not described in the Brauer et al. prior art reference.

As noted, the only prior art reference cited by the Examiner is the Brauer et al. patent, U.S. Patent No. 5,098,487. This patent mentions semi-solid slurry casting beginning at the bottom of column 7 and continuing through column 8. The only drawing figure referenced in this portion of the Brauer et al. specification is FIG. 6. Brauer et al. does not mention the creation of a "slurry billet". Brauer et al. does not mention the step of discharging such a "slurry billet" directly and immediately into the shot sleeve.

It is Applicants' position that the creation and processing of a "slurry billet" renders the claimed invention unobvious over the Brauer et al. prior art and renders the

corresponding claims patentable. Two inquiries are relevant at this point. The first inquiry is whether or not Brauer et al. discloses a "slurry billet" as that phrase is defined by Applicants in their specification. The second issue, assuming that Brauer et al. does not disclose the processing and handling of a "slurry billet", is whether there is any suggestion or motivation to try and modify the teachings of Brauer et al. to achieve the claimed invention.

What Brauer et al. discloses is the formation of slurry in a stirring chamber and feeding that slurry out by way of opening 66 through the use of an auger. It is relevant to note that the Brauer et al. disclosure, in the context of its stirring, makes reference to an auger as opposed to a simple propeller blade. The auger though, by definition of its structure and use, has two vector components, a radial component and an axial component. While the radial component may effect stirring, the axial component actually directs or pushes the material in the direction of opening 66. If one would attempt to replace the auger with electromagnetic stirring, there are numerous technical issues that are left unanswered. What is intended to replace the axial vector component when the auger is removed? Yet even if we replace the auger with electromagnetic stirring, the entirety of the Brauer et al. disclosure still describes the gradual trickle of slurry 68 by way of opening 66 into casting chamber 70. Brauer et al. still states that "when a sufficient quantity of slurry is in the die cavity 70", indicating that the slurry accumulates over time. The "sufficient quantity" is not deposited in the die cavity 70 as a single shot volume, immediately, but must accumulate. The gradual and continuous trickle of slurry, by way of opening 66, precludes this particular creation of slurry from ever being processed or moved as a "slurry billet".

With regard to why the "slurry billet" limitation renders the claimed subject matter unobvious over the Brauer et al. reference, the Board is asked to keep in mind that the present invention focuses on the overall cycle times and the desire to quickly process each "slurry billet" so that the casting through put rate can be improved. The faster the slurry is cooled to a composition suitable for casting and then transferred to the shot sleeve before that solid-to-liquid ratio can change appreciably is fundamental in achieving a shorter cycle time. This is all explained very clearly throughout the subject patent application, for example, on page 17, lines 14-31.

Of particular note is the fact that there is absolutely nothing in the Brauer et al. reference that suggests an importance in overall processing time nor are there any time intervals stated or suggested for any of the processing steps. The present invention focuses on the importance of the time cycle and the need to increase the production rate or through put speed while Brauer et al. remains silent. Not only is Brauer et al. silent on this point, but the specific steps and the specific language in the Brauer specification indicate just the opposite. Time is not an issue and, for this reason, rather than accelerating the cooling within the stirring chamber, they actually slow the process down by adding heat by way of induction heating coil 64 in order to maintain the temperature of the stirring chamber. As the slurry gradually accumulates in the die cavity 70, they have anticipated the need to add heat at that point to prevent solidification of the slurry. When one transfers a slurry billet of the right composition immediately and directly to the shot sleeve, as claimed for the present invention, these various processing concerns do not exist. There is no delay and thus no time to be concerned about the slurry possibly solidifying as it sits in the die cavity. It does not sit, but is acted upon immediately upon

being deposited. The claims recite that there is no holding of the "slurry billet" between the vessel and the shot sleeve. Brauer et al. does include a "holding" delay in the die cavity 70.

The Examiner does not address the "slurry billet" issue except in commenting about Applicants' prior arguments, specifically the response filed April 22, 2003. On page 5 of the Final Office Action, the Examiner states that the term "slurry billet" applies to the slurry that exits from opening 66. The Examiner's statement that this gradual trickle of slurry is considered to be a "slurry billet" completely ignores the definition of that phrase as provided by Applicants in the specification. Applicants are entitled to define terms that are used in the application and claims. So long as these terms and definitions are generally consistent with terminology used in the field of the art, and they are, the Examiner is required to accept the definitions.

Another limitation in each of the independent and thus, by reference, in each of the dependent claims, is the step of cooling. As has been mentioned, the specific structure illustrated in FIG. 6 of Brauer et al. does not involve any specific cooling step, cooling function, or cooling structure. Just the opposite, rather than cooling, there is an induction heating coil 64.

It is noted that in column 8, beginning with line 1, there is a description of rheocasting involving a molten alloy that is cooled in a crucible that contains means to stir the melt. There is though no mention or discussion of the stirring means nor the method of cooling, whether active or passive, and importantly, there is no "slurry billet". Instead, a sample is simply ladled out of the larger volume and transferred to a casting machine. Although FIG. 6 states that it is illustrating a casting apparatus for rheocasting

liners for shaped charged devices, the general description of rheocasting does not include induction heating coils and thus there is an obvious inconsistency between these two portions of the Brauer et al. description.

The "slurry billet" element is recited in each claim and is addressed by the creation step and by the discharging step. This claim element is thus included in each claim subgroup. There are though other recited claim elements that are found in each claim, such as the cooling step and the step of concurrent cooling and stirring.

2. Brauer et al. does not disclose specific time intervals.

Claims 2-8 and 26 recite specific time intervals for the various processing steps that are claimed in the corresponding independent claims. These claims are in Subgroup B and are considered to be patentable on their own merit for the time interval recitations. As explained for the present invention and as described in the specification, it is important to process each "slurry billet" as fast as possible, while still preserving the desired metallurgical composition, in order to maximize the production rate capability. There is a delicate and sensitive balance between the alloy temperature, the solid-to-liquid ratio, the rate of cooling, the rate of stirring, and the transfer of the slurry billet from the vessel to the shot sleeve. Since the molten alloy that is initially transferred into the vessel has a higher percent liquid than is acceptable for casting, cooling is required. The faster that this can be done without adversely affecting the resultant grain structure and other metallurgical properties of the cast alloy, the shorter the processing time and the larger the number of parts that can be produced over a given interval of time.

By precisely balancing the rate of cooling with the electromagnetic stirring and then the discharge of the "slurry billet" from the vessel to the shot sleeve, immediately

and directly as claimed, an optimal processing cycle is achieved. There is no issue that the present invention focuses on the processing times for the individual steps and on the overall cycle time of the entire process. The importance of shortening the individual time cycles and the desire to optimize the individual process steps in terms of time is an important theme that runs through the entire patent application. Although the specific time ranges and time intervals have been placed in dependent claims, this facet of the claimed invention is believed to be independently patentable and these are claim elements that are clearly not described in Brauer et al.

The Examiner comments that, with respect to these claims, the specific casting cycle time is something that would have been obvious and that it would have been obvious to obtain the optimal casting cycle time through routine experimentation. This is believed to be equivalent to a conclusory statement of what the Examiner subjectively believes to be common knowledge or common sense. There is absolutely no disclosure in Brauer et al. of any time intervals nor of any time focus nor is there any discussion of the importance of processing time or cycle times. It is also interesting to note that Applicants have requested, on several occasions, for the Examiner to provide some factual proof of these subjective opinions and to date, the Examiner has been either unwilling or unable to do so. Even in the Final Office Action, additional prior art references are not included as part of the 35 U.S.C. §103(a) rejection. Rather, they are inserted as something of an afterthought on page 6 in response to Applicants' continuing request. Interestingly though, the Examiner has still not provided any additional prior art reference nor any other factual basis for his subjective opinion that it would have been obvious to obtain the optimal casting cycle time through routine experimentation.

The elements of claims 2-8 and 26 are not described in Brauer et al. and there is no factual basis that would provide any suggestion or motivation to modify the teachings of Brauer et al. to achieve the claimed invention. Since the art of record does not disclose any type of time limitation and since there is no factual basis for any modification of the single cited reference, these claims are allowable.

3. Brauer et al. does not disclose moving the vessel into a stator.

Claims 10 and 13 (Subgroup C) are believed to be independently patentable due to the specific sequence of method steps. By moving the vessel into the stator before the alloy is transferred to the vessel, time is saved. As soon as the alloy is transferred to the vessel, electromagnetic stirring can begin. There is no wasted time and no delay. Here again, the focus of the present invention is on shortening the processing time without sacrificing cast part quality.

4. Brauer et al. does not disclose the step of clamping a thermal jacket around the vessel.

With regard to claims 12, 15, and 37 (Subgroup E), a thermal jacket is included, not only structurally, but as part of the processing method. Here again, there is absolutely no disclosure in Brauer et al. of any type of thermal jacket. While there is a heating coil 64, that coil is not described as any type of thermal jacket. Clearly, this claim element is not described in Brauer et al. and is considered to be independently patentable. Giving the Examiner as much credit as possible, we next need to evaluate whether there is a suggestion or motivation to modify the teachings of Brauer et al. in order to create the claimed invention. As noted, in In re Lee, supra, a factual question of motivation is material to patentability and cannot be resolved on subjective belief and unknown

authority. The Examiner attempts to deal with the specific language of these claims, by stating "it is a common knowledge that the heat transfer process can be regulated through the use of cooling means, heating means or insulating means". While this may be true as a general statement regarding heat transfer, it seems to have very little substance with regard to factually providing the requisite suggestion or motivation to modify the teachings of Brauer et al. Clearly the Examiner has once again provided nothing but his subjective belief and has failed to indicate that there is any suggestion or motivation to modify Brauer et al. To the extent that Brauer et al. is deficient, another reference has to be included that can be properly combined or there needs to be a factual basis and showing that there is a suggestion or motivation to modify the teachings of Brauer et al. and these factual findings are absent.

To the extent that the rate of cooling of alloy in the vessel, based on volume and the desired processing time, is not at the optimum rate, for whatever reason, the present invention contemplates the addition of a thermal jacket that can provide precisely controlled cooling to the vessel. To Applicants' knowledge, there is nothing in the prior art that shows this type of structure and its use as part of an overall processing method.

5. Brauer et all does not disclose the step of providing a flow of cooling air.

Related to some extent to the issues discussed for claims 12, 15, and 37, is the method step of introducing a flow of cooling air, as recited in claims 11 and 14 (Subgroup D). Here again, there is absolutely nothing in Brauer et al. that shows the specific method step of introducing a flow of cooling air so as to accelerate the cooling of the alloy and thereby shorten the overall cycle time. The comments just now directed to

claims 12, 15, and 37 with regard to the thermal jacket are equally applicable to the method step of introducing the flow of cooling air. There is nothing in Brauer et al. and there is nothing that the Examiner has provided of a factual nature to indicate any suggestion or motivation to modify the teachings of Brauer et al. to somehow introduce a flow of cooling air. Once again, the Examiner has done nothing more than provide his own subjective belief, without any appropriate authority. These claims are believed to be independently patentable on this basis.

6. Brauer et al. does not disclose the step of creating either a circumferential flow or a longitudinal flow.

Claims 17 and 18 (Subgroup F) recite specific stator configurations that are use in order to cause or create a specific flow pattern in the alloy within the vessel. In claim 17, the recited pattern is a circumferential flow. In claim 18, the recited pattern is a longitudinal flow. There is nothing in Brauer et al. that suggests any type of alloy flow pattern and nothing that suggests that stators can be selected and arranged to cause different flow patterns. These two claims are believed to be independently patentable for these reasons.

7. Brauer et al. does not disclose changing the voltage level applied to the stator.

With regard to claims 31-34 (Subgroup G), Applicants recite specific method steps regarding the voltage applied to the stators and the changing of that voltage level depending on other parameters. Specifically, one parameter is the electric load or feedback, a second parameter is the alloy temperature, and a third parameter is the alloy viscosity. Once again, none of these features are in any way, shape, or form suggested, taught, or disclosed by Brauer et al. Accordingly, we are left with an analysis of whether

there is any factual showing of a suggestion or motivation to modify the teachings of Brauer et al. to achieve the claimed invention. Applicants contend that there is nothing in Brauer et al. and nothing that would provide a suggestion or motivation to modify Brauer et al. Accordingly, claims 31-34 are believed to be independently patentable.

8. Brauer et al. does not disclose the step of assembling a covering cap to the vessel.

Claims 35 and 36 (Subgroup H), include the method step of assembling a covering cap to the vessel. Brauer et al. is a gradual trickle of slurry scheme and the auger stirring and axial advancement of this slurry is not at a rate such that a covering cap would ever be considered. Applicants' specification explains the benefit of having this feature and claims 35 and 36 specifically claim the step of assembling that covering cap. Since there is nothing disclosed nor suggested in Brauer et al. and there has been no factual showing of any suggestion or motivation to modify the teachings of Brauer et al., claims 35 and 36 are believed to be independently patentable.

9. Brauer et al. does not disclose a plurality of stators arranged around the vessel.

Claim 38 (Subgroup I) includes the method step of arranging a plurality of stators around an alloy-receiving vessel such that the plurality of stators includes at least one rotary stator in combination with at least one linear stator. Brauer et al. does not mention, disclose, or suggest any stator, much less any specific stator arrangement including one rotary stator and one linear stator. The absence of any such disclosure in Brauer et al. and the lack of any suggestion or motivation to modify Brauer et al. in this manner compels a conclusion that claim 38 is independently patentable for this reason.

10. There is no factual showing of a suggestion or motivation to modify Brauer et al.

It is clear that each of the claimed elements described above in subsections 1-9 are not found in Brauer et al. The only other possibility is whether there is any factual showing of a suggestion or motivation to modify Brauer et al. Affecting this analysis is the reality that any such modification would be the result of hindsight and would, in all likelihood, require a substantial change in the overall structure and inventive focus detailed in Brauer et al. As previously stated, in SIBIA Neurosciences, Inc., supra, the suggestion or motivation may be derived from the prior art reference itself which cannot be the case here, since Brauer et al. is completely silent. Alternatively, the suggestion or motivation may be derived from the knowledge of one of ordinary skill in the art, but this requires some factual showing. As indicated by the Federal Circuit in the case of In re Lee, supra, deficiencies of a cited reference cannot be remedied by the Board (or presumably by the Examiner), making general conclusions about what is basic knowledge or common sense. In this regard, the Board is asked to consider the case of W.L. Gore & Assoc., Inc. v. Garlock, Inc., 721 F.2d 1540, 1553, 220 U.S.P.Q. 303, 312-313 (Fed. Cir. 1983). One statement from that case seems to be quite appropriate with regard to the various statements made by the Examiner. "To imbue one of ordinary skill in the art with knowledge of the invention in suit, when no prior art reference or references of record convey or suggest that knowledge, is to fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher." It is Applicants' position that this is exactly what the Examiner is

doing with regard to all of the various conclusory statements made on pages 2, 3, and 4 of the Final Office Action.

11. Summary

In view of the arguments submitted, focusing specifically on the deficiencies of Brauer et al. and the lack of any suggestion or motivation to modify the teachings of Brauer et al., all of the claims now pending in the application are believed to be in condition for allowance. There is nothing in the prior art that shows the processing and discharge of a "slurry billet" and there is nothing in the prior art that shows a focus on the importance of the time intervals for the individual processing steps and the overall time interval for the creation of a "slurry billet" and the discharge of that slurry billet into the shot sleeve. Other features such as thermal jacket, the step of routing cooling air around the vessel, and the use of feedback information from the "slurry billet" are all claim elements that are not found in Brauer et al. and there has been absolutely no factual foundation or support for what the Examiner has expressed as his subjective beliefs as to what would be obvious. There clearly has been no proper showing of any suggestion or motivation to modify the teachings of Brauer et al. In fact, much of what the Examiner has suggested as features or process steps that would be obvious actually teach away from what is disclosed in Brauer et al. As confirmed in the case of In re Haruna, 249 F.3d 1327; 58 U.S.P.Q.2d 1517 (Fed. Cir. 2001), a *prima facie* case of obviousness can be rebutted if the applicant can show that the art in any material respect taught away from the claimed invention. A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be led in a direction divergent from the path that was taken by the applicant. There can be no clearer picture than the Applicants providing cooling and the prior art providing heating. Equally, the Applicants provide a "slurry

billet" as a single shot mass of material while the prior art shows a gradual trickle of slurry.

For all of the reasons advanced and the information and explanations offered herein, claims 1-19, 24-26, and 31-38 are in condition for the allowance and the Board is respectfully requested to rule favorably on the patentability of these claims.

Respectfully submitted,

By James M. Durlacher

James M. Durlacher, Reg. No. 28,840
Woodard, Emhardt, Moriarty, McNett
& Henry LLP
Bank One Center/Tower
111 Monument Circle, Suite 3700
Indianapolis, Indiana 46204-5137
(317) 634-3456

X. APPENDIX

A. Assignment to Innovative Products Group, LLC

B. Claims Under Appeal